IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of Horst Rumpf et al. APPARATUS HAVING A CONTROL CIRCUIT Serial No. 09/854,393 Filed: May 11, 2001 Confirmation No. 8218	Group Art Unit: 2655 Examiner: Jorge L. C. Ortiz I hereby certify that this correspondence is being deposited today with the United States Postal Services as first class mail in an envelope addressed to: Mail Stop Appeal Brief-Patent Commissioner for Patents P.O. Box 1450 Alexandria VA. 22313-1450 Name: James D. Leimbach Registration No. 34,374 Date: January 31, 2006

Mail Stop Appeal Brief-Patent
Honorable Commissioner of Patents and Trademarks
Alexandria VA. 22313-1450

Sir:

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Real party in interest

The real party of interest is the Assignee who is U. S. Philips Corporation, a corporation existing under the laws of the State of Delaware (hereinafter Appellant).

Related appeals and interferences

There are no related appeals or interferences to the present application that are known to appellants, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of the Claims

Claims 1-20 as filed with the present application for invention are drawn to a method and apparatus for a control circuit including a feed forward filter arrangement and a controller, wherein the parameters of the feedforward filter arrangement and the parameters of the controller are adapted by an adaptation algorithm during operation of the apparatus.

Status of the Amendments After Final

A response was filed subsequent to the final rejection to overcome the examiner's rejection of claims 1-20 under the provisions of 35 U.S.C. §103(a). The examiner in an Advisory Action dated October 4, 2005 indicated that the rejections of claims 1-20 under the provisions of 35 U.S.C. §103(a) stand.

Summary of the Claimed Subject Matter

The appealed claims define subject matter for a method and apparatus for a control circuit including a feed forward filter arrangement and a controller, wherein the parameters of the feedforward filter arrangement and the parameters of the controller are adapted by an adaptation algorithm during operation of the apparatus.

Appealed claim 1 defines subject matter for an apparatus having a control circuit as shown in Figure 1 including a feed forward filter arrangement 1 and a controller 3,

characterized in that the parameters of the feedforward filter arrangement P_{ff} and the parameters of the controller P_c are adapted by an adaptation algorithm during operation of the apparatus (as described in the specification page 3, lines 6-26).

Appealed claim 4 defines subject matter for a method for responding to effects on precision of positioning of a scanning element in a disk drive including sensing forces acting the disk drive as shown in Figure 1 and described on page 2, line 30 of the specification to the present application for invention. The converting of detected forces into disturbance signals d_s is described on page 2, lines 32-33 of the specification. Applying the disturbance signals d to a feed forward filter to obtain a disturbance variable f is shown in Figure 1 and described in the specification on page 2, line 34- page 3, line 1. Applying an adapted version of the disturbance signals as parameters to a controller is shown in Figure 1 as P_c and described on page 2, line 34- page 3 line 2 as the disturbance signals being sent to DSP 4 as well as page 3, lines 13-17. The specification on page 3, lines 18-22 describe the adjusting of the disk drive for errors using the controller. The receiving of reference variables, error signals, and control variables at a processor is described on page 3, lines 6-24. The providing outputs from the processor to alter parameters of the feed forward filter and the controller is shown in Figure one as P_{ff} and P_c from DSP 4 to feed forward filter 1 and controller 3.

Appealed claim 12 defines subject matter for an apparatus for responding to effects on precision of positioning of a scanning element as shown in Figure 1 including a control circuit having a feedforward filter 1 arrangement as shown in Figure 1 with a controller 3, an adaptation algorithm, wherein parameters of the feedforward filter arrangement and parameters of the controller are adapted by the adaptation algorithm during operation of the apparatus as described in the specification on page 3, lines 13-22.

Grounds of Rejection to be Reviewed on Appeal

The Advisory Action dated October 4, 2005 indicated that the rejections to claim 1-20 stand. Claims 1 through 20 are the appealed claims. Appealed claims 1, 3, 5-9, 12-18 and 20 are rejected under the provisions of 35 U.S.C. §103(a) has been obvious over U.S. Patent No. 6,580,579 issued in the name of Hsin et al. (hereinafter referred to as *Hsin et al.*) in view of the admitted prior art of *Hsin et al.* Appealed claims 2, 4, 10-11, and 19 are

rejected under the provisions of 35 U.S.C. §103(a) has been obvious over *Hsin et al.* in view of the admitted prior art of *Hsin et al.* and further in view U.S. Patent No. 5,619,581 issued in the name of Ferguson et al. (hereinafter referred to as *Ferguson et al.*)

Argument

I. The rejection of appealed claims 1, 3, 5-9, 12-18 and 20 under the provisions of 35 U.S.C. §103(a) has been obvious over *Hsin et al.* in view of the admitted prior art of *Hsin et al.*

A. The rejection under 35 U.S.C. S 103(a)

Appealed claims 1, 3, 5-9, 12-18 and 20 are rejected under the provisions of 35 U.S.C. §103(a) has being obvious over *Hsin et al.* (U.S. Patent No. 6,580,579) in view of the prior art that is discussed by *Hsin et al.* The examiner's position is that it would have been obvious to one of ordinary skill within the art to adapt the control circuit of *Hsin et al.* during operation with an adaptation algorithm as taught by the prior art the is discussed by *Hsin et al.*

The MPEP at §2143 states regarding the basic requirements for establishing a *prima facie* case of obviousness requires that "three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

B. The references

Hsin et al. teach the attenuation of rotational vibrations on the position of a read/write head. The rotational acceleration of the drive is sensed and applied to an adaptive filter to produce feedforward signal that is used to offset the rotational vibrations. The adaptive filter adjusts its parameters based on rotational acceleration; position error and an estimate of the transfer function of the actual position signal to the feedforward signal (see Abstract and col. 2, lines 28-36). It should be noted that the estimate of the transfer function of the actual position signal to the feedforward signal is determined off-line and stored for use by the adaptive filter in adjusting its parameters during operation (see last sentence of Abstract and col. 2, lines 36-40).

Hsin et al. disclose a servo controller (see col. 2, lines 41-54) but make no disclosure or suggestion that the parameters of the controller can be adapted by an adaptation algorithm. It should be noted that the admitted prior art discussed by *Hsin et al.* on col. 2, lines 6-12 states that Kempf used an accelerometer on a compact disc player to control the focus length of the reading lens and that the filtered-x LMS adaptation algorithm was applied to the controller parameters. There is no disclosure or suggestion within *Hsin et al.* for the parameters of the controller are adapted by an adaptation algorithm.

The appellants would like to draw the Board's attention to the discussion within *Hsin et al.* on col. 1, lines 62-67 related to admitted prior art. *Hsin et al.* on col. 1, lines 62-67 refers to *Hanks* (U.S. Patent No. 5,299,075) and states that Hanks proposed that accelerometers be used to attenuate disturbances with disc drives in which a single gain was determined **off-line** to feed the accelerometer signal in the coil motor (emphasis added).

The appellants would further like to draw the Board's attention to the discussion within *Hsin et al.* on col. 1, line 67-col. 2, line 6 related to admitted prior art. *Hsin et al.* on col. 1, line 67-col. 2, line 6 states that *Abramovitch* (Control Engineering Practise, vol. 5, no. 11, November 1997, p 1517-1524) used the least-mean-square (LMS) algorithm to estimate the value of the single gain. The appellants, respectfully, submit that the context in which the LMS algorithm as discussed by *Hsin et al.* on col. 2, lines 6-12, is that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined **off-line**. There s no disclosure or suggestion within *Hsin et al.* or *Abramovitch* that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined during operation. The appelants, respectfully, point out that the prior art discussed by *Hsin et al.*

discuss a single gain that is determined off-line and applied to the apparatus. The prior art discussed by *Hsin et al.* do not discuss the single gain being determined during operation of the apparatus.

The Applicants, respectfully, point out that there is no disclosure or suggestion within *Hsin et al.* to apply an adaptation algorithm to the controller. Additionally, there is no disclosure or suggestion within the admitted prior art discussed by *Hsin et al.* to use an adaptation algorithm to adapt the parameters of the controller during operation. The Applicants respectfully point out that *Hsin et al.* discuss certain prior art but make no disclosure or suggestion for adapting the parameters of the controller. *Hsin et al.* is clearly aware of the prior art that they discuss and make no disclosure or suggestion for making the modification suggested by the rejection. There is no disclosure or suggestion within *Hsin et al.* that would motivate a person of ordinary skill within the art to adapt parameters that control variations in external disturbances.

The appellants, respectfully, submit that there is no disclosure or suggestion within the prior art discussed by *Hsin et al.* would lead a person skilled in the art believe that control of focal length as taught by *Kempf* would be useful for compensating vibrations and internal disturbances which occur during operation of the apparatus. Moreover, there is no disclosure or suggestion in the prior art discussed by *Hsin et al.* for directly compensating anything during operation of the apparatus. The prior art discussed by *Hsin et al.* pertains to deriving a single constant gain that is obtained off-line. Furthermore, the prior art discussed by *Hsin et al.* does not disclose, suggest or mention in any way a controller that receives adapted control parameters relative to variations in external disturbances.

Hsin et al. at col. 4, lines 12-15 teach that a position error signal is used by the servo controller to generate a servo control signal; however, there is no disclosure or suggestion for adapting any parameter of the controller. *Hsin et al.* discuss certain prior art but makes no mention or suggestion to adapt the parameters to the controller. While *Hsin et al.* were clearly aware of the prior art that is discussed within their own patent application they provide no disclosure or suggestion for adapting parameters to the controller relative to variations in external disturbances.

It should be noted that there is no computational element disclosed or suggested by *Hsin et al.* that performs the adaptation algorithm to adapt parameters of the feedforward filter arrangement and the controller as asserted in the rejection.

C. The differences between the invention and the references

Appealed claim 1

Appealed claim 1 defines subject matter for an apparatus having a control circuit including a feed forward filter arrangement and a controller, wherein the parameters of the feedforward filter arrangement and the parameters of the controller are adapted by an adaptation algorithm during operation of the apparatus.

The rejection to appealed claim 1 asserts that *Hsin et al.* disclose adaptation of the parameters for the controller during operation and that the last two lines of the Abstract of *Hsin et al.* disclose "adjusting its parameters during operation". The appellants, respectfully, point out that *Hsin et al.* in the last two lines of the Abstract disclose adjusting the parameters of the adaptive filter during operation; however there is no disclosure or suggestion for adjusting the parameters of the controller during operation.

The rejection further asserts that *Hsin et al.* disclose an apparatus having a control circuit comprising a feedforward filter arrangement and a controller characterized in that an adaptation of the parameters of the feedforward filter arrangement are adapted by an adaptation algorithm during operation of the apparatus. The examiner admits that *Hsin et al.* do not disclose that the parameters of the controller can be adapted by an adaptation algorithm. The examiner's position is that it would have been obvious for a person of ordinary skill within the art to combine the admitted prior art discussed by *Hsin et al.* on col. 2, lines 6-12 with *Hsin et al.* to create the subject matter defined by appealed claim 1. The appellants, respectfully, point out that the admitted prior art discussed by *Hsin et al.* on col. 2, lines 6-12 states that *Kempf* used an accelerometer on a compact disc play to control the focus length of the reading lens. It would not have been obvious for a person skilled in the art viewing the prior art as discussed by *Hsin et al.* on col. 2, lines 6-12 to create the invention defined by appealed claim 1. The admitted prior art discussed by *Hsin et al.* on col. 2, lines 6-12 states that *Kempf* used an accelerometer on a

compact disc player to control the focus length of the reading lens and that the filtered-x LMS adaptation algorithm was applied to the controller parameters. There is no disclosure or suggestion within *Hsin et al.* or *Kempf* for the parameters of the feedforward filter arrangement and the parameters of the controller to be adapted by an adaptation algorithm during the operation of the apparatus.

The appellants, respectfully, draw Board's attention to the discussion of *Hsin et al.* on col. 1, lines 62-67 wherein the prior art reference *Hanks* propose implementation of accelerometers to attenuate disturbances with disc drives in which a single gain was determined **off-line** to feed the accelerometer signal in the coil motor (emphasis added). There is no disclosure or suggestion within *Hsin et al.* or *Hanks* for the parameters of the feedforward filter arrangement and the parameters of the controller to be adapted by an adaptation algorithm during the operation of the apparatus.

The admitted prior art discussed by *Hsin et al.* on col. 1, line 67-col. 3, line 6 states that Abramovitch used the least-mean-square (LMS) algorithm to estimate the value of the single gain. The Applicants, respectfully, assert that the LMS algorithm discussed as prior art by Hsin et al. on col. 2, lines 6-12, must be viewed in the context within which it is used i.e. that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined **off-line**. The subject matter defined by appealed claim 1 includes that the parameters of the feedforward filter arrangement and the parameters of the controller are adapted by an adaptation algorithm during operation of the apparatus, **not** off-line. There is nothing within *Hsin et al.* that would lead a person skilled in the art to believe that it is possible to adapt the parameter to the controller during operation. The appellants, respectfully, point out that the prior art discussed by *Hsin et al.* discuss a single gain that is determined off-line and applied to the apparatus. The prior art discussed by *Hsin et al.* do not disclose or suggest the single gain being determined during operation of the apparatus.

The appellants, respectfully, submit that there is no disclosure or suggestion within *Hsin et al.* to apply an adaptation algorithm to the controller. Additionally, there is no disclosure or suggestion within the admitted prior art discussed by *Hsin et al.* to use an adaptation algorithm to adapt the parameters of the controller during operation. *Hsin et al.* is clearly aware of the prior art discussed within their own specification yet make no disclosure or

suggestion for making the modification that has been suggested by the rejection. Furthermore, there is no disclose or suggestion within *Hsin et al.* that would motivate a person of ordinary skill within the art to adapt parameters that control variations in external disturbances. The rejection cites *Hsin et al.* and the prior art cited within in the combination made by the rejection; however, *Hsin et al.* make no disclosure or suggestion of the combination made by the rejection. Additionally, the rejection does not provide any reasonable expectation of success for the combinations made in the rejection or for the modifications that are made to those references used in making rejection. Accordingly, the rejection does not establish a *prima facie case* of obviousness.

Appealed claim 3

Appealed claim 3 defines the subject matter of appealed claim 1 wherein the apparatus includes a disk for storage disk media, in which vibrations and internal disturbances which occur during operation of the apparatus are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller. The rejection to appealed claim 3 states that *Hsin et al.* disclose compensating for internal disturbances and vibrations. The appellants, respectfully, point out that appealed claim 3 defines subject matter for a disk for storage disk media, in which vibrations and internal disturbances which occur during operation of the apparatus are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller. There is no disclosure or suggestion within *Hsin et al.* or the admitted prior art discussed therein or suggestion for adjusting the parameters of the controller during operation.

The rejection asserts that the combination of *Hsin et al.* with the prior art discussed therein disclose or suggest the a disk drive for storage disk media in which vibrations and internal disturbances, which occur during operation of the apparatus, are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller. As discussed in the appeal to the rejection of appealed claim 1, the prior art discussed by *Hsin et al.* applies a filter LMS adaptation algorithm to control the focus length of reading lens. Appealed claim 3 defines subject matter for compensation by the adaptation algorithm of vibrations and internal disturbances that occur during operation of the

apparatus. The vibrations and internal disturbances are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller. There is no disclosure or suggestion within the prior art discussed by *Hsin et al.* that would lead a person skilled in the art believe that control of focal length by as discussed by *Kempf* would be useful for compensating vibrations and internal disturbances which occur during operation of the apparatus. Moreover, there is no disclosure or suggestion in the prior art discussed by *Hsin et al.* for directly compensating anything during operation of the apparatus. The prior art discussed by *Hsin et al.* pertains to deriving a single constant gain off-line.

Appealed claim 5

Appealed claim 5 defines the subject matter of appealed claim 1, wherein the controller comprises an error signal input, for receiving error signals responsive to operation of a controlled device; an input for receiving adapted control parameters, relative to variations in type of external disturbances of the controlled device; and a control variable output for supplying signals for controlling the controlled device responsive to both the error signal and the adapted control parameters. The rejection to appealed claim 5 alleges that the combination of *Hsin et al.* and prior art discussed therein disclose or suggest a controller that comprises an input for receiving adapted control parameters relative to variations in external disturbances. The appellants, respectfully, assert that *Hsin et al.* do not disclose, suggest or mention in any way, a controller that receives an adapted control parameter. Furthermore, the prior art discussed by *Hsin et al.* does not disclose, suggest or mention in any way a controller that receives adapted control parameters relative to variations in external disturbances.

The appellants, respectfully, submit that the requirements for establishing a *prima facie* case of obviousness are not met by the rejection to appealed claim 5. Furthermore, the combination of *Hsin et al.* with the prior art discussed therein do not disclose, suggest a controller that receives adapted control parameters relative to variations in external disturbances.

Appealed claim 6

Appealed claim 6 defines subject matter for the apparatus defined by appealed claim1 wherein the apparatus further includes a storage media, in which vibrations and internal disturbances are compensated by the adaptation algorithm that adapts parameters of the feedforward filter arrangement, the parameters of the controller and the disturbance-variable feedforward. The rejection to appealed claim 6 contends that the combination of *Hsin et al.* with the prior art discussed therein renders obvious the subject matter defined by appealed claim 6. The appellants, respectfully, point out that *Hsin et al.* at col. 4, lines 12-15 teach that a position error signal is used by the servo controller to generate a servo control signal; however, there is no disclosure or suggestion for adapting any parameter of the controller. *Hsin et al.* discuss certain prior art but makes no disclosure, mention or suggestion to adapt the parameters to the controller. *Hsin et al.* were clearly aware of the prior art discussed within their own patent application yet provide no disclosure or suggestion for adapting parameters to the controller relative to variations in external disturbances.

Appealed claim 7

Appealed claim 7 defines the subject matter of appealed claim 6 wherein the feedforward filter arrangement receives a disturbance signal from sensors and further comprising the disturbance signal being received by a computational element that performs the adaptation algorithm, wherein the computational element employs a current position reference from a storage device and an error reference from the storage device to adapt parameters of the feedforward filter arrangement and the controller.

The rejection to appealed claim 7 asserts that the combination of *Hsin et al.* with the prior art discussed therein disclose or suggest an apparatus that comprises a feedforward filter arrangement that receives a disturbance signal from sensors and further comprising the disturbance signal being received by a computational element that performs the adaptation algorithm. As previously discussed under the discussion to appealed claim 1, *Hsin et al.* combined with the prior art discussed therein does not disclose or suggest a controller that receives adapted control parameters relative to variations in external disturbances. The

appellants respectfully submit that the examiner is attempting to read subject matter into the cited reference *Hsin et al.* that, simply put, is not there. *Hsin et al.* is clearly aware of the prior art discussed therein but does not envision adapting parameters to the control relative to variations in external disturbances.

Appealed claim 8

Appealed claim 8 defines subject matter for the apparatus defines by appealed claim 7 wherein the computational element that performs the adaptation algorithm employs at least one control variable from the controller to adapt parameters of the feedforward filter arrangement and the controller. The appellants assert that the combination of *Hsin et al.* with the prior art discussed by *Hsin et al.* do not disclose or suggest a computational element that performs the adaptation algorithm employs at least one control variable from the controller to adapt parameters of the feedforward filter arrangement and the controller.

Appealed claim 9

Appealed claim 9 defines the subject matter of appealed claim 1 wherein the controller and the feedforward filter arrangement are responsive to external events including vibrations or temperature variations in components of the apparatus. The rejection to appealed claim 9 asserts that the combination of *Hsin et al.* with the prior art discussed therein render obvious the subject matter defined by appealed claim 9. The appellants respectfully assert that the combination of *Hsin et al.* with the prior art discussed therein do not disclose or suggest a controller and the feedforward filter arrangement that are responsive to external events such as vibrations and temperature variations in components of the apparatus.

Appealed claim 12

Appealed claim 12 defines subject matter for an apparatus for responding to effects on precision of positioning of a scanning element including: a control circuit having a feedforward filter arrangement; a controller; an adaptation algorithm; wherein parameters of the

feedforward filter arrangement and parameters of the controller are adapted by the adaptation algorithm during operation of the apparatus.

The rejection of appealed claim 12 asserts that *Hsin et al.* combined with the prior art discussed therein render obvious the elements of appealed claim 12. The teachings of *Hsin et al.* combined with the prior art discussed therein do not disclose or suggest a controller that receives adapted control parameters relative to variations in external disturbances. The appellants respectfully point out that *Hsin et al.* discuss certain prior art but make no disclosure or suggestion to adapt the parameters to the controller. *Hsin et al.* are clearly aware of the prior art that they themselves discuss, but no disclosure or suggestion is made for adapting parameters to the controller relative to variations in external disturbances.

Appealed claim 13

Appealed claim 13 defines the apparatus of appealed claim 12 further comprising a computational element that performs the adaptation algorithm. The appellants assert that the teachings of *Hsin et al.* combined with the prior art discussed therein do not disclose or suggest a computational element that performs the adaptation algorithm, wherein parameters of the feedforward filter arrangement and parameters of the controller are adapted by the adaptation algorithm during operation of the apparatus.

Appealed claim 14

Appealed claim 14 defines subject matter for the apparatus of appealed claim 12, wherein the controller includes: an error signal input, for receiving error signals responsive to operation of a controlled device; an input for receiving adapted control parameters, relative to variations in external disturbances of the controlled device; and a control variable output for supplying signals for controlling the controlled device responsive to both the error signal and the adapted control parameters.

The rejection pf appealed claim 14 states that the combination of *Hsin et al.* with admitted prior art as discussed therein shows the controller comprising an error signal input, for receiving error signals responsive to operation of a controlled device. The appellants,

respectfully, submit that *Hsin et al.* combined with the prior art discussed therein does not disclose or suggest an input to receive adapted control parameter relative to variations in external disturbances.

Appealed claim 15

Appealed claim 15 defines subject matter for the apparatus of appealed claim 12 wherein the apparatus includes a storage media, in which vibrations and internal disturbances are compensated by the adaptation algorithm that adapts parameters of the feedforward filter arrangement, the parameters of the controller and the disturbance-variable feedforward. The rejection to appealed claim 15 asserts that *Hsin et al.* combined with the prior art discussed therein render obvious the subject matter for appealed claim 15. The appellants assert that *Hsin et al.* combined with the prior art discussed therein do not disclose or suggest an apparatus for a storage media, in which vibrations and internal disturbances are compensated by an adaptation algorithm that adapts parameters of the feedforward filter arrangement, the parameters of the controller, and the disturbance-variable feedforward. The combination *Hsin et al.* with the prior art discussed therein do not disclose or suggest an input to receive adapted control parameter relative to variations in external disturbances.

Appealed claim 16

Appealed claim 16 defines the subject matter for the apparatus of appealed claim 15 wherein the feedforward filter arrangement receives a disturbance signal from sensors and further comprising the disturbance signal being received by a computational element that performs the adaptation algorithm, wherein the computational element employs a current position reference from a storage device and an error reference from the storage device to adapt parameters of the feedforward filter arrangement and the controller. The rejection alleges that *Hsin et al.* combined with the prior art discussed therein render obvious the subject matter of appealed claim 16. The appellants, respectfully, assert that *Hsin et al.* combined with the prior art discussed therein do not disclose or suggest a feedforward filter arrangement that receives a disturbance signal from sensors and the disturbance signal being received by a computational

element that performs the adaptation algorithm to adapt parameters of the feedforward filter arrangement and the controller. The appellants, respectfully point out that there is no computational element discussed in *Hsin et al.* More specifically, there is no disclosure or suggestion for a computational element that performs the adaptation algorithm to adapt parameters of the feedforward filter arrangement and the controller within *Hsin et al.*.

Appealed claim 17

Appealed claim 17defiens the subject matter of appealed claim 16 wherein the computational element that performs the adaptation algorithm employs at least one control variable from the controller to adapt parameters of the feedforward filter arrangement and the controller.

The rejection to appealed clam 17 states that *Hsin et al.* combined with the prior art discussed therein show the computational element that performs the adaptation algorithm employs at least one control variable from the controller to adapt parameters of the feedforward filter arrangement and the controller. The appellants, respectfully point out that there is no computation element discussed in *Hsin et al.* More specifically, there is no disclosure or suggestion for a computational element that performs the adaptation algorithm using a variable from the controller to adapt parameters of the feedforward filter arrangement and the controller within the combination of *Hsin et al.* and the prior art discussed therein as asserted in the rejection.

Appealed claim 18

Appealed claim 18 defines subject matter for the apparatus of appealed claim 12 wherein the controller and the feedforward filter arrangement are responsive to external events including vibrations or temperature variations in components of the apparatus.

The rejection contents that *Hsin et al.* combined with the prior art discussed therein renders obvious the subject mater of appealed claim 18. The appellant assert that *Hsin et al.* combined with the prior art discussed therein do not disclose or suggest the controller and the

feedforward filter arrangement are responsive to external events such as vibrations and temperature variations in components of the apparatus.

Appealed claim 20

Appealed claim 20 defines subject matter for the apparatus defined by appealed claim 12, wherein the apparatus includes disk drive for storage disk media, in which vibrations and internal disturbances which occur during operation of the apparatus are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller.

The rejection to appealed claim 20 asserts that *Hsin et al.* combined with the prior art discussed therein renders obvious the subject matter defined by appealed claim 20. The appellants, respectfully, submit that *Hsin et al.* combined with the prior art discussed therein do not disclose or suggest an apparatus that comprises a storage disk media, in which vibrations and internal disturbances are compensated by the adaptation algorithm that adapts parameters of the feedforward filter arrangement, the parameters of the controller and the disturbance-variable feedforward.

II. The rejection of appealed claims 2, 4, 10-11 and 19 under the provisions of 35 U.S.C. §103(a) has been obvious over *Hsin et al.* in view of the admitted prior art of *Ferguson et al.* (U.S. Patent No. 5,619,581)

A. The rejection under 35 U.S.C. S 103(a)

Claims 2, 4, 10-11, and 19 are rejected under the provisions of 35 U.S.C. §103(a) as being unpatentable over *Hsin et al.* combined with the prior art discussed by *Hsin et al.* and further in view of U.S. Patent No. 5,619,581 issued to Ferguson et al. (hereinafter referred to as *Ferguson et al.*).

The MPEP at §2143 states regarding the basic requirements for establishing a *prima facie* case of obviousness requires that "three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine

reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

The MPEP at §2143.01 states that if" the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)."

The MPEP at §2143.01 further states that if "proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)."

B. The references

Hsin et al. (U.S. Patent No. 6,580,579) has been discussed extensively under the appeal to the rejection of claims 1, 3, 5-9, 12-18 and 20 under the provisions of 35 U.S.C. §103(a) has being obvious over *Hsin et al.* in view of the prior art that is discussed by *Hsin et al.* Briefly stated, *Hsin et al.* teach the attenuation of rotational vibrations on the position of a read/write head. The rotational acceleration of the drive is sensed and applied to an adaptive filter to produce feedforward signal that is used to offset the rotational vibrations. The adaptive filter adjusts its parameters based on rotational acceleration; position error and an estimate of the transfer function of the actual position signal to the feedforward signal (see Abstract and col. 2, lines 28-36). It should be noted that the estimate of the transfer function of the actual position signal to the feedforward signal is determined off-line and stored for use by the adaptive filter in adjusting its parameters during operation (see last sentence of Abstract and col. 2, lines 36-40).

Hsin et al. disclose a servo controller (see col. 2, lines 41-54) but make no disclosure or suggestion that the parameters of the controller can be adapted by an adaptation

algorithm. *Hsin et al.* on col. 2, lines 6-12 states that *Kempf* used an accelerometer on a compact disc player to control the focus length of the reading lens and that the filtered-x LMS adaptation algorithm was applied to the controller parameters.

Hsin et al. on col. 1, lines 62-67 refers to *Hanks* (U.S. Patent No. 5,299,075) and states that Hanks proposed that accelerometers be used to attenuate disturbances with disc drives in which a single gain was determined **off-line** to feed the accelerometer signal in the coil motor.

The discussion within *Hsin et al.* on col. 1, line 67-col. 2, line 6 states that *Abramovitch* used the least-mean-square (LMS) algorithm to estimate the value of the single gain. The context in which the LMS algorithm as discussed by *Hsin et al.* on col. 2, lines 6-12, is that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined **off-line**. There s no disclosure or suggestion within *Hsin et al.* or *Abramovitch* that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined during operation. The appellants, respectfully, point out that the prior art discussed by *Hsin et al.* discuss a single gain that is determined off-line and applied to the apparatus.

There is no disclosure or suggestion within *Hsin et al.* to apply an adaptation algorithm to the controller. Additionally, there is no disclosure or suggestion within the admitted prior art discussed by *Hsin et al.* to use an adaptation algorithm to adapt the parameters of the controller during operation. *Hsin et al.* discuss certain prior art but make no disclosure or suggestion for adapting the parameters of the controller. *Hsin et al.* make no disclosure or suggestion for making the modification suggested by the rejection. There is no disclosure or suggestion within *Hsin et al.* that would motivate a person of ordinary skill within the art to adapt parameters that control variations in external disturbances.

Ferguson et al. (U.S. Patent No. 5,619,581) teaches a noise vibration and cancellation system with the adaptation path and the feedfoward path implemented in separate hardware to reduce the burden on the Digital Signal Processor (see Abstract and Summary of the Invention on col. 1, line 55-col. 2, line 18). It should be noted that while *Ferguson et al.* on col. 3, lines 35-66 teaches that the DSP supplies the adaptation weight coefficients, the basic premise of *Ferguson et al.* is that the adaptation algorithm is not executed by the DSP.

It should further be noted that there is no disclosure or suggestion within *Ferguson et al.* to apply an adaptation algorithm to the controller. Additionally, there is no disclosure or suggestion within *Ferguson et al.* to use an adaptation algorithm to adapt the parameters of the controller during operation.

C. The differences between the invention and the references

Appealed claims 2 and 19

Appealed claims 2 and 19, respectively, define the subject matter of appealed claims 1 and 12, wherein the adaptation algorithm is executed on a microprocessor, particularly a digital signal processor.

The rejection to appealed claims 2 and 19, asserts that *Ferguson et al.* teaches a control system for cancellation of vibration wherein an adaptation algorithm is executed by a microprocessor and specifically a Digital Signal Processor (DSP). The examiner asserts that *Ferguson et al.* on col. 3, lines 35-66 disclose that an adaptation algorithm is executed by a microprocessor and specifically a DSP. The appellants would, respectfully, point out that *Ferguson et al.* on col. 3, lines 35-66 states that the adaptation weight coefficients are supplied by the DSP and **not** that an adaptation algorithm is executed by the DSP as asserted by the examiner in the rejection. The entire purpose of *Ferguson et al.* is for the adaptation path and the feed forward path to be implemented in separate hardware and specifically not on a DSP (see Abstract and Summary of the Invention of *Ferguson et al.*). Accordingly, the assertions made in the rejection are in error.

The combination of *Ferguson et al.* with *Hsin et al.* would render *Ferguson et al.* unfit for its intended purpose. The entire purpose of *Ferguson et al.* is for the adaptation path and the feed forward path to be implemented in separate hardware and, specifically, not using a DSP. Therefore, the proposed modification stated within the rejection would render the *Ferguson et al.* so modified unsatisfactory for its intended purpose. Accordingly, there is no suggestion or motivation to make the modification proposed by the rejection.

The combination of *Ferguson et al.* with *Hsin et al.* would change the principle of operation of *Ferguson et al.* so modified. The principle pf operation of *Ferguson et al.* is for the

adaptation path and the feed forward path to be implemented in separate hardware and, specifically, not using a DSP. Therefore, the proposed modification stated within the rejection would change the principle of operation of *Ferguson et al.* so modified. Accordingly, the rejection does not make a *prima facie* of obviousness.

The appellants further point out that the combination made by the rejection does not teach or suggest the parameters of the controller being adapted by a digital signal processor. Therefore, there remain unfound features within the rejected claims that are not found by the rejection and the rejection does not make a *prima facie* of obviousness.

Appealed claim 4

Appealed claim 4 defines subject matter for a method for responding to effects on precision of positioning of a scanning element in a disk drive, the method including: sensing forces acting the disk drive; converting detected forces into disturbance signals; applying the disturbance signals to a feed forward filter to obtain a disturbance variable; applying an adapted version of the disturbance signals as parameters to a controller; adjusting the disk drive for errors using the controller; receiving reference variables, error signals, and control variables at a processor; providing outputs from the processor to alter parameters of the feed forward filter and the controller.

The examiner's position in making the rejection of claim 4 is that *Hsin et al.* combined with the prior art discussed therein renders obvious the subject matter defined by appealed claim 4. Specifically, the examiner alleges that one with ordinary skill in the art at the time of the invention would have found it obvious to apply an adapted version of the disturbance signals as parameters to the controller. The appellants, respectfully, point out that *Hsin et al.* on col. 2, lines 6-12 discusses that *Kempf* used an accelerometer on a compact disc player to control the focus length of the reading lens and that the filtered-x LMS adaptation algorithm was applied to the controller parameters; which does not disclose or suggest the application of an adapted version of the disturbance signals as parameters to the controller.

The appellants further point out that *Hsin et al.* on col. 1, lines 62-67 refers to *Hanks* and states that Hanks proposed that accelerometers be used to attenuate disturbances with disc drives in which a single gain was determined **off-line** to feed the accelerometer signal in the

coil motor. The appellants respectfully assert that *Hsin et al.* in view of *Hanks* do not disclose or suggest the application of an adapted version of the disturbance signals as parameters to the controller.

The appellants further point out that the discussion within *Hsin et al.* on col. 1, line 67-col. 2, line 6 states that *Abramovitch* used the least-mean-square (LMS) algorithm to estimate the value of the single gain. The context in which the LMS algorithm as discussed by *Hsin et al.* on col. 2, lines 6-12, is that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined **off-line**. There s no disclosure or suggestion within *Hsin et al.* or *Abramovitch* that an LMS adaptation algorithm is used to estimate the value of the single gain and that the single gain is determined during operation. The appellants, respectfully, point out that the prior art discussed by *Hsin et al.* discuss a single gain that is determined off-line and applied to the apparatus.

The appellants, respectfully, assert that *Hsin et al.* combined with the prior art discussed therein does not disclose or suggest the application of an adapted version of the disturbance signals as parameters to the controller.

The combination of *Ferguson et al.* with *Hsin et al.* would render *Ferguson et al.* unfit for its intended purpose. The entire purpose of *Ferguson et al.* is for the adaptation path and the feed forward path to be implemented in separate hardware and, specifically, not using a DSP. Therefore, the proposed modification stated within the rejection would render the *Ferguson et al.* so modified unsatisfactory for its intended purpose. Accordingly, there is no suggestion or motivation to make the modification proposed by the rejection.

The combination of *Ferguson et al.* with *Hsin et al.* would change the principle of operation of *Ferguson et al.* so modified. The principle pf operation of *Ferguson et al.* is for the adaptation path and the feed forward path to be implemented in separate hardware and, specifically, not using a DSP. Therefore, the proposed modification stated within the rejection would change the principle of operation of *Ferguson et al.* so modified. Accordingly, the rejection does not make a *prima facie* of obviousness.

The appellants further point out that the combination made by the rejection does not teach or suggest the parameters of the controller being adapted by a digital signal processor.

Therefore, there remain unfound features within the rejected claims that are not found by the rejection and the rejection does not make a *prima facie* of obviousness.

Appealed claim 10

Appealed claim10, defines subject matter for the method of appealed claim 4 wherein the step of applying the adapted version of the disturbance signals as parameters to the controller further comprises applying an adapted version of the disturbance signals as parameters to the feedforward filter.

The rejection asserts that the combination of *Hsin et al.* with the prior art discussed therein and *Ferguson et al.* renders obvious the step of applying the adapted versions of the disturbance signals as parameters to the controller and further applying an adapted versions of the disturbance signals as parameters to the feedforward filter. The appellants, respectfully, assert that, *Hsin et al.* combined with the prior art discussed, therein and *Ferguson et al.* do not disclose or suggest the application of an adapted version of the disturbance signals as parameters to the controller.

Appealed claim 11

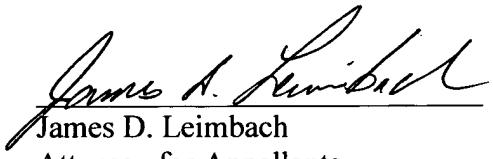
Appealed claim 11 defines the subject matter of the method of claim 10 wherein the step of providing outputs from the processor to alter parameters of the feedforward filter and the controller employs reference variables, error signals, and control variables to alter parameters of the feedforward filter and the controller.

The rejection asserts that the combination of *Hsin et al.* with the prior art discussed therein and *Ferguson et al.* renders obvious the step of providing outputs from the processor to alter parameters of the feedforward filter and the controller employs reference variables, error signals, and control variables to alter parameters of the feedforward filter and the controller. The appellants, respectfully, assert that the combination of *Hsin et al.* with the prior art discussed therein and *Ferguson et al.* does not disclose or suggest the providing of outputs from the processor to alter parameters of the feedforward filter and the controller employs reference variables, error signals, and control variables to alter parameters of the feedforward filter and the controller.

Conclusion

In summary, the examiner's rejections of the claims are believed to be in error for the reasons explained above. The rejections of each of claims 1-20 should be reversed.

Respectfully submitted,



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APPENDIX I. Claims on Appeal

1. An apparatus having a control circuit which comprises a feed forward filter arrangement and a controller, characterized in that the parameters of the feedforward filter arrangement and the parameters of the controller are adapted by an adaptation algorithm during operation of the apparatus.

2. An apparatus as claimed in Claim 1, characterized in that the adaptation algorithm is executed on a microprocessor, particularly a digital signal processor.

3. An apparatus as claimed in Claim 1 characterized in that said apparatus includes a disk for storage disk media, in which vibrations and internal disturbances which occur during operation of the apparatus are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller.

4. A method for responding to effects on precision of positioning of a scanning element in a disk drive, the method comprising:

- sensing forces acting the disk drive;
- converting detected forces into disturbance signals;
- applying the disturbance signals to a feed forward filter to obtain a disturbance variable;
- applying an adapted version of the disturbance signals as parameters to a controller;
- adjusting the disk drive for errors using the controller;
- receiving reference variables, error signals, and control variables at a processor;
- providing outputs from the processor to alter parameters of the feed forward filter and the controller.

5. The apparatus of claim 1, wherein the controller comprises

- an error signal input, for receiving error signals responsive to operation of a controlled

device;

- an input for receiving adapted control parameters, relative to variations in type of external disturbances of the controlled device; and
- a control variable output for supplying signals for controlling the controlled device responsive to both the error signal and the adapted control parameters.

6. The apparatus of Claim 1 wherein the apparatus further comprises a storage media, in which vibrations and internal disturbances are compensated by the adaptation algorithm that adapts parameters of the feedforward filter arrangement, the parameters of the controller and the disturbance-variable feedforward.

7. The apparatus of Claim 6 wherein the feedforward filter arrangement receives a disturbance signal from sensors and further comprising the disturbance signal being received by a computational element that performs the adaptation algorithm, wherein the computational element employs a current position reference from a storage device and an error reference from the storage device to adapt parameters of the feedforward filter arrangement and the controller.

8. The apparatus of Claim 7 wherein the computational element that performs the adaptation algorithm employs at least one control variable from the controller to adapt parameters of the feedforward filter arrangement and the controller.

9. The apparatus of Claim 1 wherein the controller and the feedforward filter arrangement are responsive to external events including vibrations or temperature variations in components of the apparatus.

10. The method of Claim 4 wherein the step of applying the adapted version of the disturbance signals as parameters to the controller further comprises applying an adapted version of the disturbance signals as parameters to the feedforward filter.

11. The method of claim 10 wherein the step of providing outputs from the processor to alter parameters of the feedforward filter and the controller employs reference variables, error signals, and control variables to alter parameters of the feedforward filter and the controller.

12. An apparatus for responding to effects on precision of positioning of a scanning element comprising:

a control circuit having a feedforward filter arrangement;

a controller;

an adaptation algorithm;

wherein parameters of the feedforward filter arrangement and parameters of the controller are adapted by the adaptation algorithm during operation of the apparatus.

13. The apparatus of Claim 12 further comprising a computational element, wherein the computational element performs the adaptation algorithm.

14. The apparatus of Claim 12, wherein the controller comprises:

an error signal input, for receiving error signals responsive to operation of a controlled device;

an input for receiving adapted control parameters, relative to variations in external disturbances of the controlled device; and

a control variable output for supplying signals for controlling the controlled device responsive to both the error signal and the adapted control parameters.

15. The apparatus of Claim 12 wherein the apparatus further comprises a storage media, in which vibrations and internal disturbances are compensated by the adaptation algorithm that adapts parameters of the feedforward filter arrangement, the parameters of the controller and the disturbance-variable feedforward.

16. The apparatus of Claim 15 wherein the feedforward filter arrangement receives a disturbance signal from sensors and further comprising the disturbance signal being received by a computational element that performs the adaptation algorithm, wherein the computational

element employs a current position reference from a storage device and an error reference from the storage device to adapt parameters of the feedforward filter arrangement and the controller.

17. The apparatus of Claim 16 wherein the computational element that performs the adaptation algorithm employs at least one control variable from the controller to adapt parameters of the feedforward filter arrangement and the controller.

18. The apparatus of Claim 12 wherein the controller and the feedforward filter arrangement are responsive to external events including vibrations or temperature variations in components of the apparatus.

19. An apparatus as claimed in Claim 12, wherein adaptation algorithm is executed by a digital signal processor.

20. An apparatus as claimed in Claim 12, wherein the apparatus includes disk drive for storage disk media, in which vibrations and internal disturbances which occur during operation of the apparatus are compensated by the adaptation algorithm optimizing the parameters of the feedforward filter arrangement and the parameters of the controller.